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Before the  
Federal Communications Commission  
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of

CONSTELLATION COMMUNICATIONS, INC.

Amendment of Parts 2 and 25  
of the Commission's Rules to  
Implement LEO Satellite Systems  
in the RDSS Bands and Grant a  
Pioneer's Preference

File No. 7771

PETITION FOR RULEMAKING  
AND  
REQUEST FOR PIONEER'S PREFERENCE

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## EXECUTIVE SUMMARY

Constellation Communications, Inc. ("CONSTELLATION"), by its attorneys hereby submits this Petition for Rulemaking and Request for Pioneer's Preference. Through this Petition, CONSTELLATION seeks the establishment of a regulatory structure for the licensing and regulation of low-Earth orbit ("LEO") satellite systems operating in the RDSS bands. In particular, CONSTELLATION urges the Commission to adhere to its open entry policies and authorize multiple LEO systems. Additionally, CONSTELLATION urges the Commission to expeditiously grant the pending LEO applicants' licenses to implement their systems. Finally, CONSTELLATION urges the Commission to promote spectral efficiency in an economically sound manner.

In order to effectuate these policy goals CONSTELLATION urges the Commission to: (1) assign 2 MHz of frequency to all qualified applicants in the RDSS L-band and allow shared access on a non-exclusive basis by multiple entrants in the RDSS S-band; (2) establish operating criteria to allow multiple LEO systems to coexist in the RDSS bands; (3) establish a committee of licensees to coordinate system implementation; (4) establish a mechanism to assign in the future additional frequency to LEO system licensees in the RDSS bands and (5) grant to LEO licensees a renewal expectancy. Also, CONSTELLATION urges the Commission to support proposals to allocate the RDSS bands to the mobile satellite service on a primary basis.

In the Request for Pioneer's Preference, CONSTELLATION seeks Commission recognition of the innovative ARIES system and the innovative approach for implementing LEO systems in the RDSS bands. It requests that the Commission immediately grant CONSTELLATION authority to utilize the frequency necessary to implement the ARIES system.

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**PETITION FOR RULEMAKING AND  
REQUEST FOR PIONEER'S PREFERENCE**

**INTRODUCTION**

Constellation Communications, Inc. ("CONSTELLATION" or "Petitioner"), by its attorneys, hereby submits this Petition for Rulemaking and Request for Pioneer's Preference. By this Petition, CONSTELLATION seeks Commission initiation of a rulemaking proceeding to establish a regulatory structure for licensing low earth orbit ("LEO") satellite systems in the 1610-1626.5 MHz and 2483.5-2500 MHz bands currently allocated to the radiodetermination satellite service ("RDSS bands"). CONSTELLATION is also seeking a Pioneer Preference so that it may be assigned the necessary frequency for it to commence construction and operation of its proposed satellite system.

CONSTELLATION is a new venture undertaken with the cooperation and support of its strategic technical partners -- MicroSat Launch Systems, Inc. ("MicroSat"), Pacific Communication Sciences, Inc., ("PCSI") and Defense Systems, Inc. ("DSI"). CONSTELLATION, with its strategic partners, has brought together unmatched expertise in the areas of low cost satellite launch services, mobile transceiver development and space station manufacturing to develop a truly innovative and a commercially viable LEO system. Concurrently with the filing of this Petition, CONSTELLATION has submitted to the Commission a Satellite System Application and individual applications for each of the 48 LEO satellites that comprise the initial ARIES system. This satellite system will be organized into four polar orbit planes of twelve satellites each.

The ARIES system will operate in conjunction with mobile units and gateway earth stations dispersed over wide geographic areas. It will serve customers located in rural or remote areas in the United States and abroad who are not likely to have access to cellular or other mobile radio systems. The system will provide position determination and reporting services, telephone, data and facsimile transmission services, as well as fleet surveillance and control for the transportation and public service communities where such services are not practical over conventional terrestrial systems. The ARIES system also will be able to provide real-time two-way data collection, distribution and control for remote sensor networks. This innovative and dynamic use of the RDSS bands by the ARIES system

will enable many needed telecommunication services to be provided to governments, industry and the general public.

## **II. PETITION FOR RULEMAKING**

CONSTELLATION respectfully requests that the Commission initiate a rulemaking proceeding expeditiously so that LEO services can be promptly provided to the public.

### **BACKGROUND**

The Commission previously has addressed the allocation of the 1610-1626.5 MHz and 2483.5-2500 MHz bands.<sup>1/</sup> In the Allocation Order, the Commission authorized the use of both bands for radiodetermination satellite service. In a subsequent order,<sup>2/</sup> the Commission established baseline parameters for use of these bands through geostationary satellites<sup>3/</sup> utilizing spread spectrum techniques and left it to the licensees to coordinate their systems. In addition, the Commission

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<sup>1/</sup> Amendment of the Commission's Rules to Allocate Spectrum for, and to Establish other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, Gen. Docket No. 84-689, 58 Rad. Reg. 2d 1416 (1985) ("Allocation Order").

<sup>2/</sup> Amendment of the Commission's Rules to Allocate Spectrum for, and to Establish other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, 104 FCC 2d 650 (1986) ("Licensing Order").

<sup>3/</sup> Additional bands in the vicinity of 5.1 GHz and 6.5 GHz were also identified for RDSS feeder links.

established procedures for new RDSS applications.<sup>4/</sup> Of the initial applicants for geostationary RDSS licenses, only Geostar Positioning Corporation pursued the implementation of RDSS service.<sup>5/</sup>

Recently, the Commission received a number of applications for use of the RDSS bands by LEO satellite systems. The applications of Motorola Satellite Communications, Inc.<sup>6/</sup> and Ellipsat Corporation<sup>7/</sup> appeared on Public Notice on April 1, 1991.<sup>8/</sup> Each of these systems appear to propose exclusive use of the entire 1610-1625 MHz band, and Ellipsat also appears to request exclusive use of the entire 2483.5-2500 MHz band. CONSTELLATION has submitted this Petition in order to establish a process to allow LEO systems to operate in the RDSS bands in a manner compatible with spread spectrum geostationary systems. Also, it is necessary to clarify the regulatory structure to be used to authorize LEO systems in the RDSS bands. CONSTELLATION urges the Commission to expeditiously consider this Petition and all the LEO RDSS applications so that the public can receive the benefits of LEO systems as soon as possible.

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<sup>4/</sup> Id. at 667.

<sup>5/</sup> GEOSTAR has recently filed for liquidation with the Bankruptcy Court.

<sup>6/</sup> File Nos. 9-DSS-P-91(87) and CSS-91-010

<sup>7/</sup> File No. 11-DSS-P-91(6)

<sup>8/</sup> Report No. DS-1068 (April 1, 1991).

## **POLICY CONSIDERATIONS**

CONSTELLATION believes that the Commission should adhere to the basic policies it has utilized for RDSS service when considering how to implement LEO satellites in the RDSS bands. In particular, the Commission should continue to pursue multiple entry and reject all attempts to establish a monopoly service in these bands. Also, the Commission should utilize a regulatory mechanism that allows for prompt implementation of this valuable service. Finally the Commission should promote efficient use of the frequency in an economically sound and practical manner.

### **A. The Commission Must Adhere to its Open Entry Policies**

The concept of open or multiple entry has served as a foundation for Commission policy in the areas of domestic satellites (including RDSS) and elsewhere. By requiring competitive offerings of services, the Commission has fostered price and service competition that has greatly benefitted the public. A fundamental tenet of the Commission's regulatory policies during the last fifteen years is that competition will ensure that the price of service is related to cost. It also will stimulate a licensee to develop new innovative technology and services.

The value of the initial FCC decision to permit multiple satellite systems has been recently recognized by members of the current Commission:



Our basic communications policy, is grounded in confidence that markets work best -- particularly when characterized by open entry, and full and fair competition. And, that confidence in market competition is borne out of nearly 20 years of generally positive regulatory experience -- which has proven to be very beneficial for our country. . . . We are fortunate that, as U.S. satellite policy was being developed, it wasn't shaped by determinists, but rather by humble and visionary people. The humble realized that they might lack adequate insight into the future to justify limiting opportunities. And, the visionaries saw unlimited possibilities -- and realized the spur of competition was the best means of converting their vision into reality. Today, in Washington, communications policymakers are required to navigate in increasingly crowded, tempestuous waters. And, in my judgment, we're most likely to chart a course which proves good for the country, if we remember the "Open Skies" success.

Remarks of Alfred C. Sikes, 1990 FCC LEXIS 879 (Feb. 7. 1990). Open entry already has been used as a guiding force in the licensing of the RDSS bands. In the RDSS Licensing Order, the Commission clearly endorsed open entry stating:

While technical efficiency is a desirable goal, we have found that the benefits of competition, including continued innovation, will be best provided by independently licensed multiple system.<sup>9/</sup>

These policies must continue to guide the Commission's hand and must be applied in the area of LEO satellites operating in the RDSS bands. Open entry provides the best hope of fostering innovation and price competition in a market which promises to develop a new line of lower cost services for the public.

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<sup>9/</sup> Licensing Order, *supra* note 2, at 654.

**B. The Commission Can Authorize Multiple LEO Systems in the RDSS Bands**

The objectives that were followed in the domestic satellite decisions can be applied even with the limited frequency available for LEO systems:

The objective . . . is to accommodate as many applicants as possible with a minimum of regulatory intrusion.<sup>10/</sup>

As is described more fully in Petitioner's regulatory proposal outlined below, a similar approach to assigning spectrum resources to interested applicants can be accomplished for low earth orbit satellite operators.

CONSTELLATION as well as other parties have predicted a market in excess of 2,500,000 mobile satellite service users. The initial ARIES system utilizing a small portion of the frequency resource can be economically viable with approximately 100,000 subscribers. Additionally, the innovative frequency plan developed for ARIES demonstrates that multiple systems can be accommodated. Under these circumstances, the Commission can and should authorize multiple entrants to implement low-Earth orbit systems in the RDSS bands.

**C. The Commission's Regulatory Structure Must Emphasize Expeditious Implementation of Service**

As the Commission witnessed with cellular radio, there is a strong consumer demand for innovative mobile communication services. In

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<sup>10/</sup> Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, 84 FCC2d 584, 588 (1981).

many rural and remote areas of the country there are no telecommunication services at all. This includes services to support industry and government as well as emergency and other public services. Also, it does not seem that any communication services will be provided to these areas soon. Cellular service is not likely to be implemented in remote areas, and the D.C. Circuit's recent decision concerning the American Mobile Satellite Corporation<sup>11/</sup> has delayed implementation of geostationary mobile satellite services. Consequently, there is now greater need for the Commission to promptly license LEO systems.

In order to ensure that LEO systems utilizing the RDSS bands are authorized promptly, it is imperative that the Commission avoid using cumbersome licensing processes such as comparative hearings, lotteries or consortiums. Comparative hearings would be extremely time-consuming and costly to both the Commission and the applicants. Furthermore, such a process would provide no advantage to the public and would delay provision of service. Lotteries would entail administrative costs and delays resulting from analyzing the winners' qualifications. They also would cause a delay in service being provided to the public. Finally, it is no longer clear that the Commission can utilize forced consortiums as a licensing mechanism.

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<sup>11/</sup> Aeronautical Radio, Inc. v. FCC, 928 F.2d 428 (D.C. Cir. 1991).

Consequently, the only viable means for the Commission to ensure that these licenses are awarded quickly is to issue as many licenses as possible to all qualified applicants. All other mechanisms will result in delays and increased administrative cost without any appreciable benefit to the public.

D. The Commission Must Promote Spectral Efficiency.

Spectral efficiency should be a basic objective of the Commission in establishing the regulatory framework for LEO as possible systems. However, achieving maximum spectrum efficiency should be phased in over time.<sup>12/</sup> The Commission should not favor very high capacity systems simply because they are high capacity. Instead, the Commission should favor systems with spectrum resource requirements that are commensurate with market demand and promote competition.

Spectral efficiency can be defeated in two ways. The Commission could allow frequencies to remain unused for many years pending development of sophisticated space station technology. As has been discussed above, this inefficiency would not be in the public interest.

Similarly, the Commission could authorize only one LEO system creating a monopoly for this service based on the initial promise of high spectral efficiency from the outset.

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<sup>12/</sup> The most successful example of such a phased introduction of stringent technical standards is the phasing in of two degree spacing for the fixed satellite service. Cellular cell splitting is another example of phased introduction of increasing frequency re-use to meet growing traffic demands.

Once the monopoly is granted, realities of the market are likely to lead the licensee to redefine the system parameters so that spectrum efficiency matches economic realities.<sup>13/</sup> If the Commission accepts this redefinition, the monopolist would have successfully obtained its license based on representations made to the Commission that were never implemented. If the Commission does not accept this approach, everyone will have to start from scratch and the provision of service will be delayed.

### **REGULATORY PROPOSAL**

In order to effectuate the above policy goals, the Petitioner respectfully submits the following regulatory proposal for the Commission to utilize in the assignment and regulation of LEO systems in the RDSS bands.

#### **A. Assign Initial Spectrum Resources to All Qualified Applicants**

All applicants that are able to satisfy the Commission's technical, legal and financial qualification requirements should be treated in a similar manner and be granted a minimum of 2 MHz frequency in the 1610-1626 band and 16.5 MHz on a

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<sup>13/</sup> Given the enormous amount of capital necessary to implement a LEO satellite system, economic realities are likely to militate against over designing the system. However, the licensee will not have to face such realities until such time as it begins to procure the satellites and the launch vehicles. Any potential financier or investor will want to review the market analysis to insure that it matches prospective expenses and revenues. It is likely that any market analysis provided today will have grown stale by the time the actual licenses are granted. Thus, as was the case with Geostar Corporation, the licensee may be forced into a complete system redesign.

shared, non-exclusive basis in the 2483.5-2500 MHz band.<sup>14/</sup> This should permit all qualified applicants to establish initial systems and test market demand before committing more resources to a more developed and expensive system.

**B. Establish Operating Criteria to Enable Competing Systems to Coexist**

In order to provide the appropriate framework for the LEO market to develop; the Commission must set baseline technical parameters for noninterference and compatibility between systems as well as how the frequencies are utilized. (e.g. continuous seamless coverage). Use of these criteria will promote flexibility and innovation as well as permit competition through open entry. Also, criteria should be established that allows spread spectrum geostationary and low earth orbit satellites to coexist in the band.

**C. Establish a Committee to Coordinate System Implementation**

As is the case with geostationary RDSS systems, an industry committee of LEO licensees should be established to coordinate operations among low earth orbit licensees. This committee should be used to promote maximum flexibility for LEO systems and provide a mechanism to allow introduction of new low earth orbit systems.

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<sup>14/</sup> This assumes that enough frequency is available to accommodate all applicants. If this is not the case, the Commission may want to consider a multilevel qualifications approach as means to implement service. Conversely, if there is more frequency available than needed to accommodate all applicants, additional frequency should be assigned in an equitable manner or held in reserve for future use.

**D. Establish Mechanism for Future Frequency Assignments**

The Commission should develop a mechanism to assign new frequencies for subsequent generations of low earth orbit satellite systems as licensees demonstrate demand that exceeds initial assignments. This additional frequency may be necessary in order to allow systems to upgrade to seven cell frequency reuse.

In addition, the current power flux density limits in the 2483.5-2500 MHz band will limit the ultimate amount of service that can be provided to the public in these bands. While an increase in those limits is desirable, it might be difficult to get the agreement of other countries to accept such increases. The alternative is to allocate a larger portion of the 2400-2500 MHz band to LEO satellite downlinks so that a greater number of voice and data channels can be provided by LEO systems in this band using spread spectrum techniques to keep the satellite operations in conformance with the power flux density limits.

**E. Renewal Expectancy Should Be Established for LEO Systems.**

LEO satellites generally have a design life of approximately five years. Before anyone will commit the large capital necessary to construct and implement a LEO system, confidence must exist that the Commission will authorize a subsequent generation of satellites. No one will build and implement a LEO system for one generation only. Consequently, CONSTELLATION urges the Commission to establish a renewal expectancy for all LEO licensees. Such a renewal expectancy

will provide a greater degree of confidence that investments, including research and development in more advanced and spectrum efficient satellite designs, can be recovered from future generations of satellites in the system. This expectancy should indicate that the LEO licensee will be authorized to construct and operate follow-on systems unless they have acted in a manner directly contrary to the FCC's rules or policies.

**F. LEO Systems Should Be Able to Provide a Wide Variety of Mobile Services.**

In its Docket No. 89-544 Notice of Inquiry proceeding to prepare for the 1992 WARC, the Commission has proposed to allocate the 1610-1626.5 MHz and 2483.5-2500 MHz bands to the mobile satellite service on a primary basis. If this proposal were adopted, there would be no need to restrict the voice and data services proposed by CONSTELLATION to be "ancillary" to the position determination services provided by the ARIES satellites. CONSTELLATION supports this proposal and believes that the Commission should consider adding the Mobile Satellite Service to the domestic table of allocations even before the 1992 conference because of the increased flexibility such an allocation would provide domestic licensees.

In any event, the Commission should adopt revisions to its rules to accommodate LEO systems operating in the RDSS bands. Rules and regulations could be incorporated as revisions to the current Section 25.392, or a new section paralleling Section 25.392 could be adopted for LEO systems operating in the RDSS bands. Of course, if the Commission decides to include the Mobile Satellite Service in



the table of allocations for the 1610-1626.5 and 2483.5-2500 MHz, Section 25.392 can be generalized to apply to all satellite services in these bands.

The above regulatory approach will allow the Commission to expeditiously consider and process the pending applications and at the same time create an environment that provides the public with all the benefits from multiple competitive low earth orbit systems in the RDSS bands. CONSTELLATION urges the Commission to consider and adopt these proposals as quickly as possible.

### **III. REQUEST FOR PIONEER'S PREFERENCE**

Petitioner hereby requests a pioneer's preference pursuant to the Commission recent order<sup>15/</sup> recognizing this preference. In the Pioneer's Preference Order the Commission recognized the need to encourage the development of new and innovative uses of the spectrum resource. By providing applicants for new services with a pioneer's preference, the Commission has attempted to promote the development of new technology that might not otherwise be brought to the marketplace. Due to Petitioner's efforts to develop this innovative use of the RDSS frequencies and to bring new services to previously unserved areas and users, Petition requests grant of a pioneer's preference.

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<sup>15/</sup> Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services, GEN Docket No. 90-217, Report and Order (May 13, 1991) ("Pioneer's Preference Order").

The CONSTELLATION application and Petition for Rulemaking represent the very type of proposal that the Commission wanted to encourage when it adopted the rules on Pioneer Preference. The CONSTELLATION proposal is designed to provide new and innovative telecommunication services to many areas and people that do not have access to any telecommunication services today. The ARIES satellite system will be available everywhere in the United States and the world. If a user has access to the ARIES receiver he or she can be reached at, or communicate from, any location. Whether it be in the middle of the Grand Canyon, the National Forests of Oregon, or a military operation in the Middle East, all that will be required to communicate with another person is a receiver.

There can be no doubt that CONSTELLATION's proposal is the most practical means of implementing this new service. The ARIES system has been designed with the recognition that it must be capable of growing into a system that achieves high frequency reuse through the use of small spot beams on board future ARIES satellites, and that multiple systems and technologies must be authorized by the Commission. At the same time, the ARIES design approach allows small, low-cost satellites to be employed in the first generation of satellites before the market demand economically justifies the use of high frequency reuse satellites and their attendant high costs. This approach will ensure that this service is brought to the public in the most expeditious time period and in the most economically efficient manner possible.

CONSTELLATION also seeks a minimal amount of spectrum resource in order to implement its system. It does not seek to obtain as much spectrum resource as possible in order that it can have the opportunity to serve some unknown market in the next century. Rather, it has requested enough to serve the needs of users of its initial system. It has proposed a frequency assignment scheme in which each licensee is initially assigned a minimal amount of uplink spectrum in the uplink RDSS L-band and access to the 16.5 MHz downlink S-band on a non-exclusive shared basis by spread spectrum systems to ensure compliance with existing power flux density limits. It also proposes either an increase in the S-band power flux density limits or an expansion of the S-band spectrum between 2400-2500 MHz allocated to LEO downlinks to increase the total amount of voice and data capacity available to the public within the constraints of these power flux density limits. This approach allows multiple systems to be established and service to be provided in an expeditious fashion. Certainly this approach brings the benefits of competition to the public and enables the Commission to avoid cumbersome and time consuming licensing process.

The ARIES satellite system will include several unique and dynamic technologies. Defense Systems Inc., a world leader in micro-satellites, has designed the innovative ARIES satellite as outgrowth of other satellites that it has pioneered for the U.S. military. Pacific Communication Services, Inc. is designing the dynamic ARIES receiver. The technological underpinnings of the receiver is based on PCSI's work in developing a variety of other mobile satellite and terrestrial receivers. Finally, MicroSat Launch Systems, Inc. is currently developing the Orbital Express™ launch

vehicle which will pave the way for the micro-satellite revolution and enable the ARIES satellites to be launched into orbit in a cost-efficient and reliable manner. These three technological developments represent breakthroughs that will enable LEO satellite systems to be commercially viable.

In order to demonstrate the capabilities of this technology, CONSTELLATION is also requesting authority to construct and launch two experimental satellites -- ARIES X-1 and ARIES X-2. These satellites will be used to help develop and demonstrate in practice the innovative technologies to be implemented in the ARIES system.

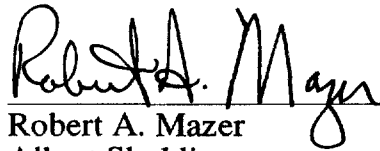
Based on the above, CONSTELLATION respectfully requests that the Commission grant it a Pioneer's Preference to construct, launch and operate the ARIES satellite system. In particular, it requests that the Commission immediately grant it authority to utilize 2 MHz exclusively in the RDSS L-band and 16 MHz in the 2483.5-2500 MHz band on a non-exclusive shared basis so that it can immediately commence construction of the ARIES satellites. This will enable the public to receive the innovative services to be provided through this new and unique satellite system in the very near future.

#### **IV. CONCLUSION**

Constellation Communications, Inc. respectfully requests that the Commission implement the above policy proposals outlined in the Petition for

Rulemaking and grant CONSTELLATION a Pioneer's Preference to implement the ARIES satellite system.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert A. Mazer", is written over a horizontal line.

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